A sequentially coupled shape and topology optimization method

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A sequentially coupled shape and topology optimization method

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Motivation

A sequentially coupled shape and topology optimization method

Scope

Sequential solution strategy

Coupled optimization model

Research gap

Subject to

with

Structural design problem

- Minimizing the compliance \( c \) of a structure with volume \( V \) constraint, e.g. as shown in Fig. 1.
- Shape optimization (SO).
- Topology optimization (TO).

Application (3D & 2.5D)

3D design problem

- Coupled optimization for 3D structure shown as following example.

2.5D design problem

- Coupled optimization of a 2.5D beam-type structure shown in Fig. 2.

Conclusions and future work

- An optimization framework aims to optimally place a given amount of material in an optimal design domain, implemented to solve 2D, 2.5D and 3D design problems.
- The results of representative case studies clearly show that the features of the design domain can have a large influence on the final topology.
- Future work: solving the coupled optimization model in a parallel manner, and incorporating the aerodynamic analysis in the framework for wind turbine blade design.